

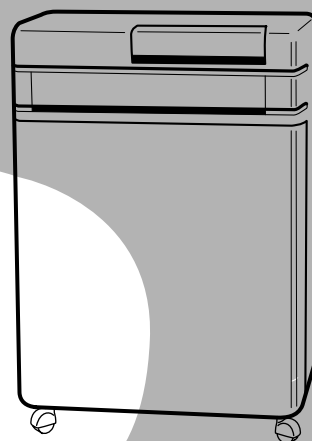
TOSHIBA

FILE NO. A00-9607

SERVICE MANUAL

ROOM AIR-CONDITIONER PORTABLE TYPE

RAC-08EW-E



CONTENTS

1. SPECIFICATIONS	3
2. SPECIFICATIONS OF ACCESSORIES	3
3. APPEARANCE	4
4. SPECIFICATIONS OF ELECTRICAL PARTS	4
5. WIRING DIAGRAM (RAC-08EW-E)	5
6. COOLING CHARACTER CHART	6
7. REFRIGERATING CYCLE DIAGRAM.....	7
8. MICROCOMPUTER BLOCK DIAGRAM	8
9. OPERATION DESCRIPTIONS	9
9-1. Operation Control Knobs on Control Panel	9
10. OUTLINE OF OPERATIONS	10
10-1. Basic Operation	10
10-2. Economy Mode	10
10-3. Dry Mode	11
10-4. Economy Operation	11
11. TROUBLESHOOTING CHART	12
11-1. What to be Prechecked First	12
11-2. How to Judge Faulty Parts by Symptoms	13
11-3. PC Board Layout	22
12. INSTALLATION INSTRUCTION	24
12-1. Installation Method	24
12-2. Routine Maintenance	24
12-3. Water Supply	24
12-4. Changing of Water	25
12-5. Relocation of Air Conditioner	25
13. CLEANING METHOD OF CONDENSER	26
13-1. Condenser Servicing Procedures	26
14. EXPLODED VIEWS AND PARTS LIST	27

Note:

A special tool is required to remove the back cabinet.

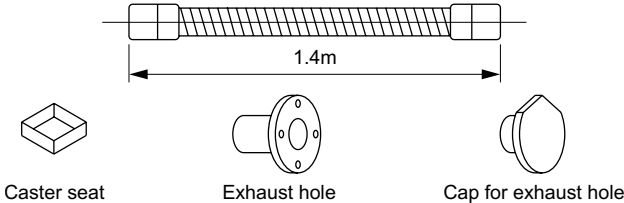
(In EXPLODED VIEWS AND PARTS LIST, Location No. 256 "Screw Driver")

1. SPECIFICATIONS

Item		Model	RAC-08EW-E
Dimensions	Height	mm	720
	Width	mm	500
	Depth	mm	315
Net weight		kg	35
Power source	Frequency	Hz	50
	Rated voltage	V	1 phase, 220/230/240
Standard performance	Cooling capacity	kW	2.10/2.18/2.18
	Airflow, high	m ³ /h	390/400/410
	Moisture removal	lit/h	1.2
Electrical characteristics	Running current	A	3.82/3.80/3.85
	Power consumption	W	780/800/840
	Power factor		93/92/91
Compressor	Model, output		PH94X1-4G1, 750W
Condenser			Ripple tube type, Forced air ventilation Finned tube type, Aircooled ventilation
Evaporator			Finned tube type, Aircooled ventilation
Safety devices			Float switch, Over current relay
Fan motor (for indoor and exhaust)			20W, Induction motor
Refrigerant			R-22, (Charged quantity, 0.47 kg)
Air filter			Polypropylene net filter
Power cord			3-core (One core for grounding), 1.9 m (6.4 ft) length with plug
Accessories			Exhaust hose, Caster seat, Exhaust hole, Cap for exhaust hole

Specifications are subject to change without notice.

2. SPECIFICATIONS OF ACCESSORIES

Item	Q'ty	Remarks
Exhaust hose	1	 1.4m Caster seat Exhaust hole Cap for exhaust hole
Caster seat	4	
Exhaust hole	3	
Cap for exhaust hole	3	

3. APPEARANCE

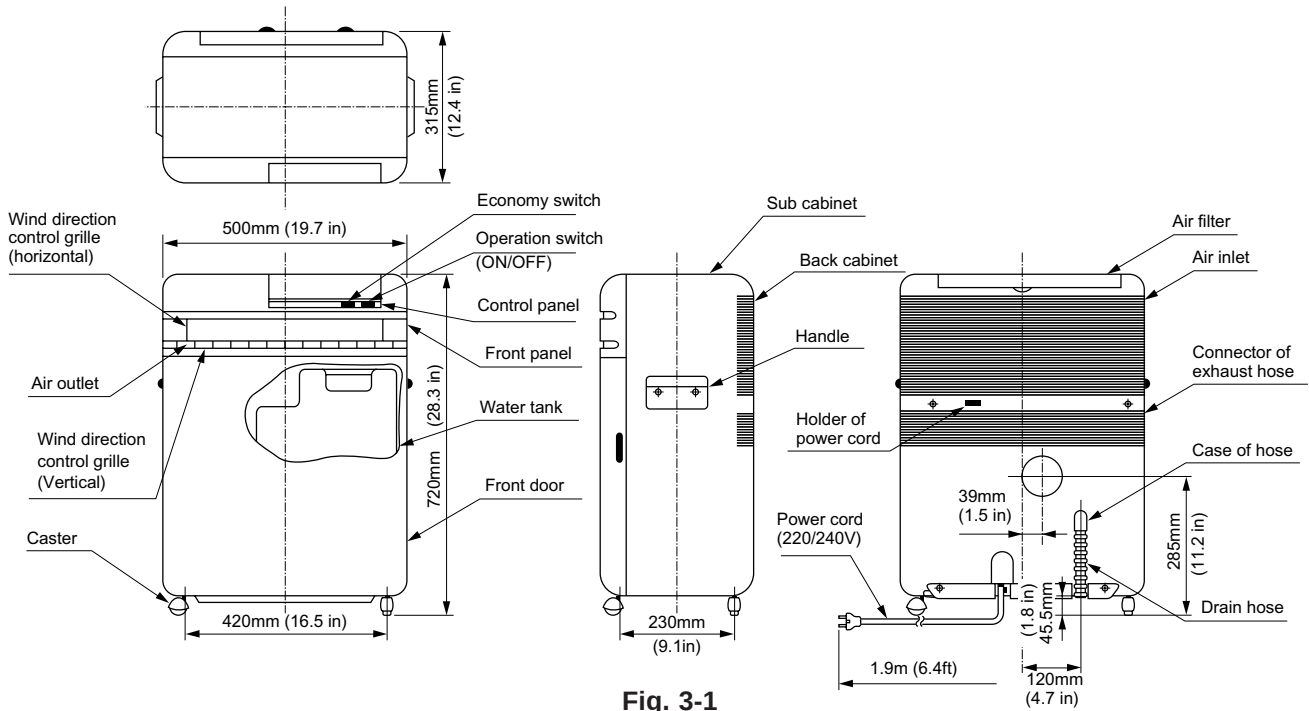


Fig. 3-1

4. SPECIFICATIONS OF ELECTRICAL PARTS

Parts name	Type	Specifications			
Compressor	PH94X1-4G1	Single phase, 50 Hz, 220/230/240V ~, AC. 750W output			
		Winding resistance (Ω) (at 20°C)	Red-Black	White-Black	Red-White
			4.55	8.55	13.1
Fan motor	STF-230-20-4C	Single phase, 50 Hz, 230V, AC. 20W output			
		Winding resistance (Ω) (at 20°C)	Red-Black	Black-Orange	Orange-Blue
			205.0	145.9	111.1
Running capacitors	EARU40M206UF	400V, 20μF (for compressor)			
	EET2H105HWNB05	500V, 1μF (for fan motor)			
Relay	AJE6412	250V, 3A (for fan motor)			
	PC12D2	250V, 15A (for compressor)			
Float switch	FS-085-002F	Rated current, 0.1A 100V DC			
Transformer	FT67-2	Primary 220V ~ 240V, Secondary 12.3V ~ 13.6V			
Microcomputer	TMP47C440AN				
Room temperature sensor (Ta-sensor)	(Microcomputer)	Differential ±2°C, Adjustable range 17 ~ 28°C			
Heat-exchanger sensor (Tc-sensor)	(Microcomputer)	Differential ±2°C			
Power supply cord with plug		Copper wire minimum 1.0 mm ²			
Fuse	TSCR	6.3A			

5. WIRING DIAGRAM (RAC-08EW-E)

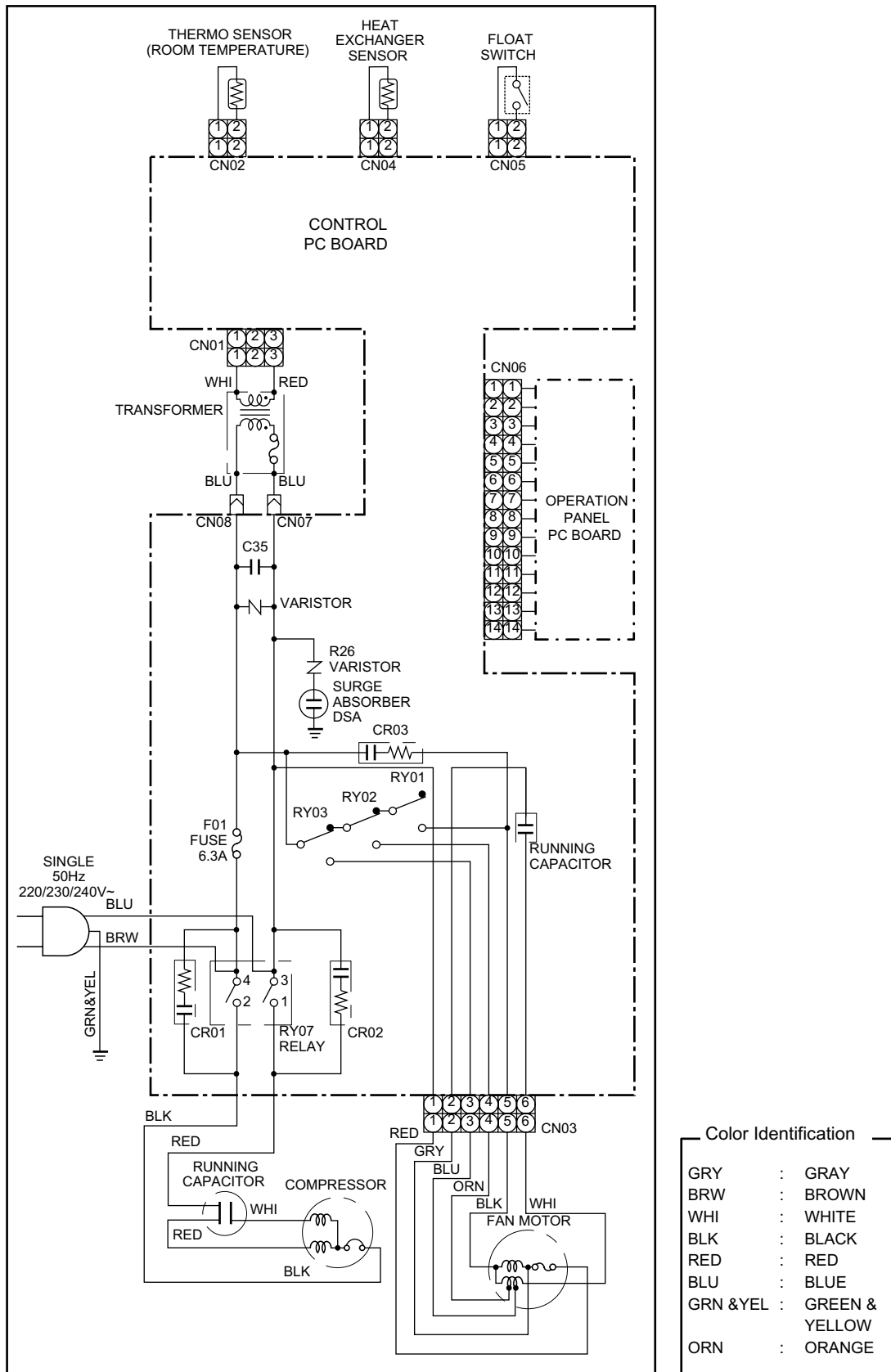


Fig. 5-1

6. COOLING CHARACTER CHART

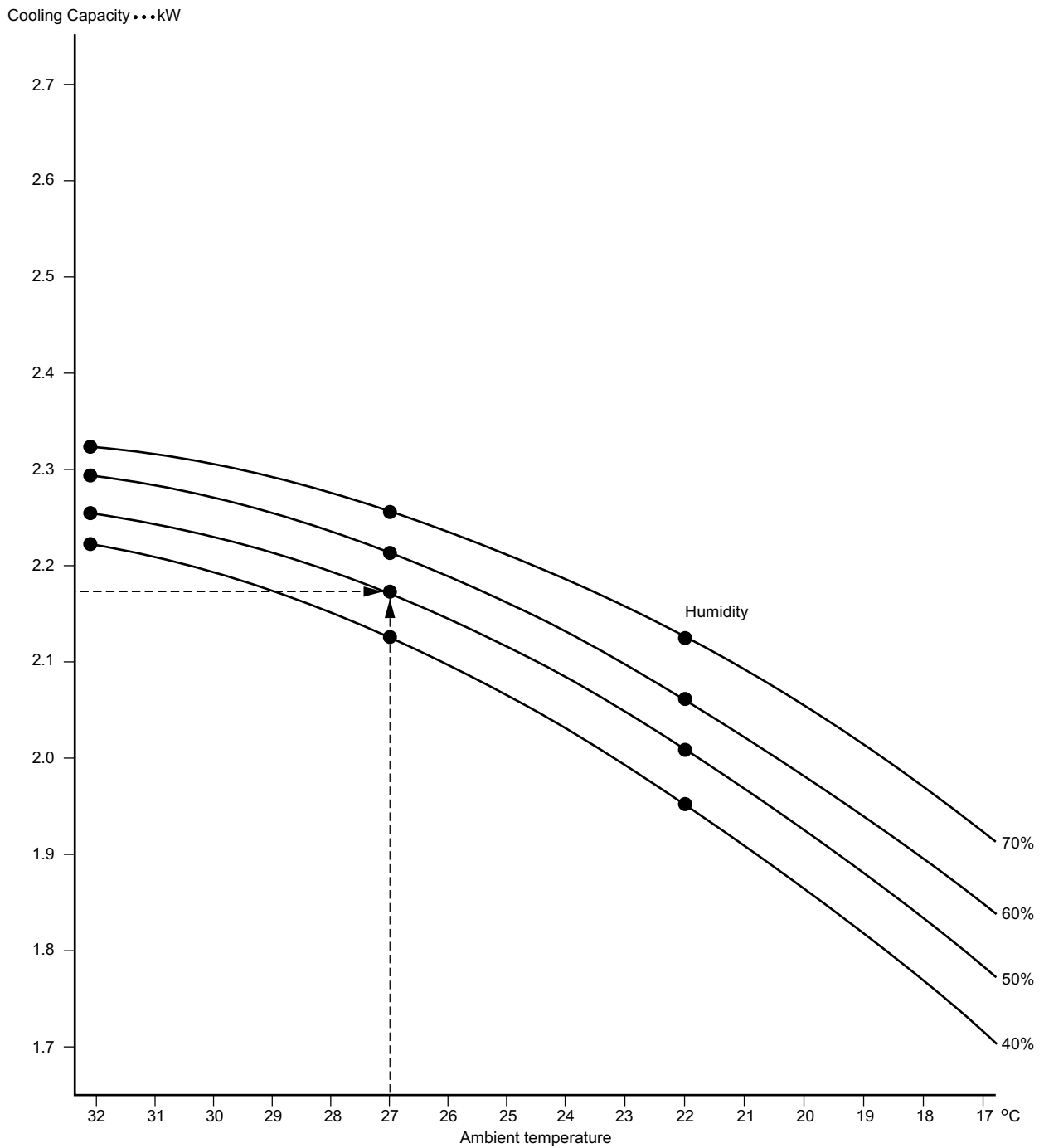


Fig. 6-1

7. REFRIGERATING CYCLE DIAGRAM

RAC-08EW-E

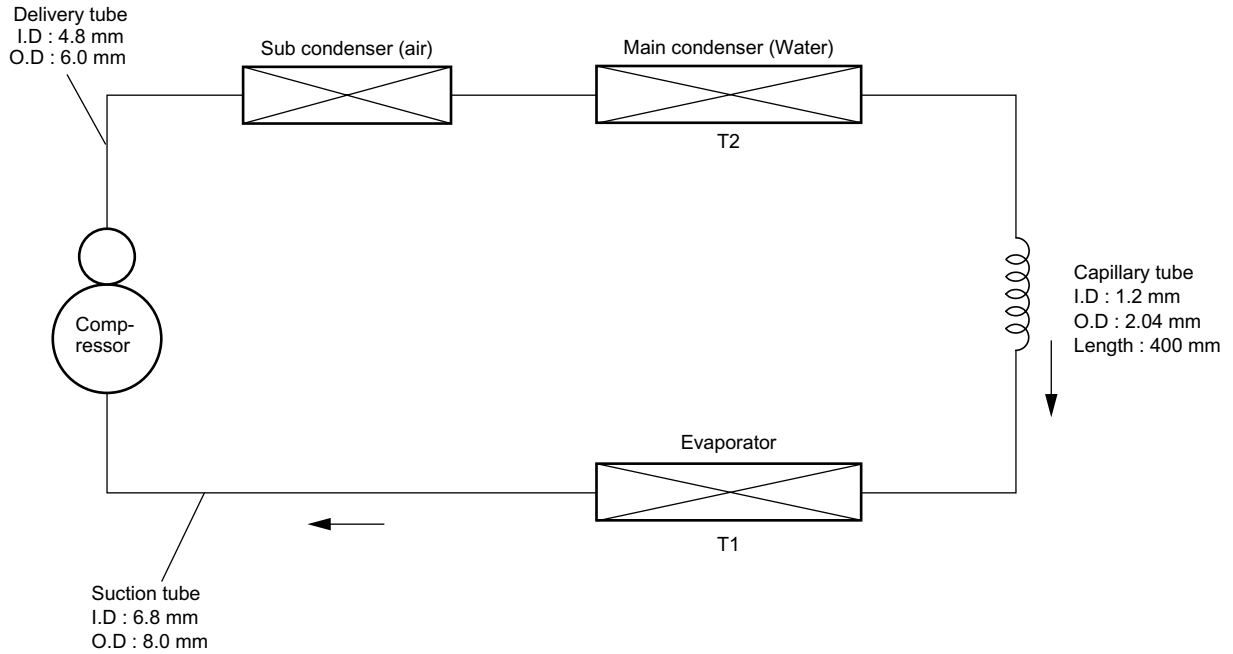


Fig. 7-1

RAC-08EW-E

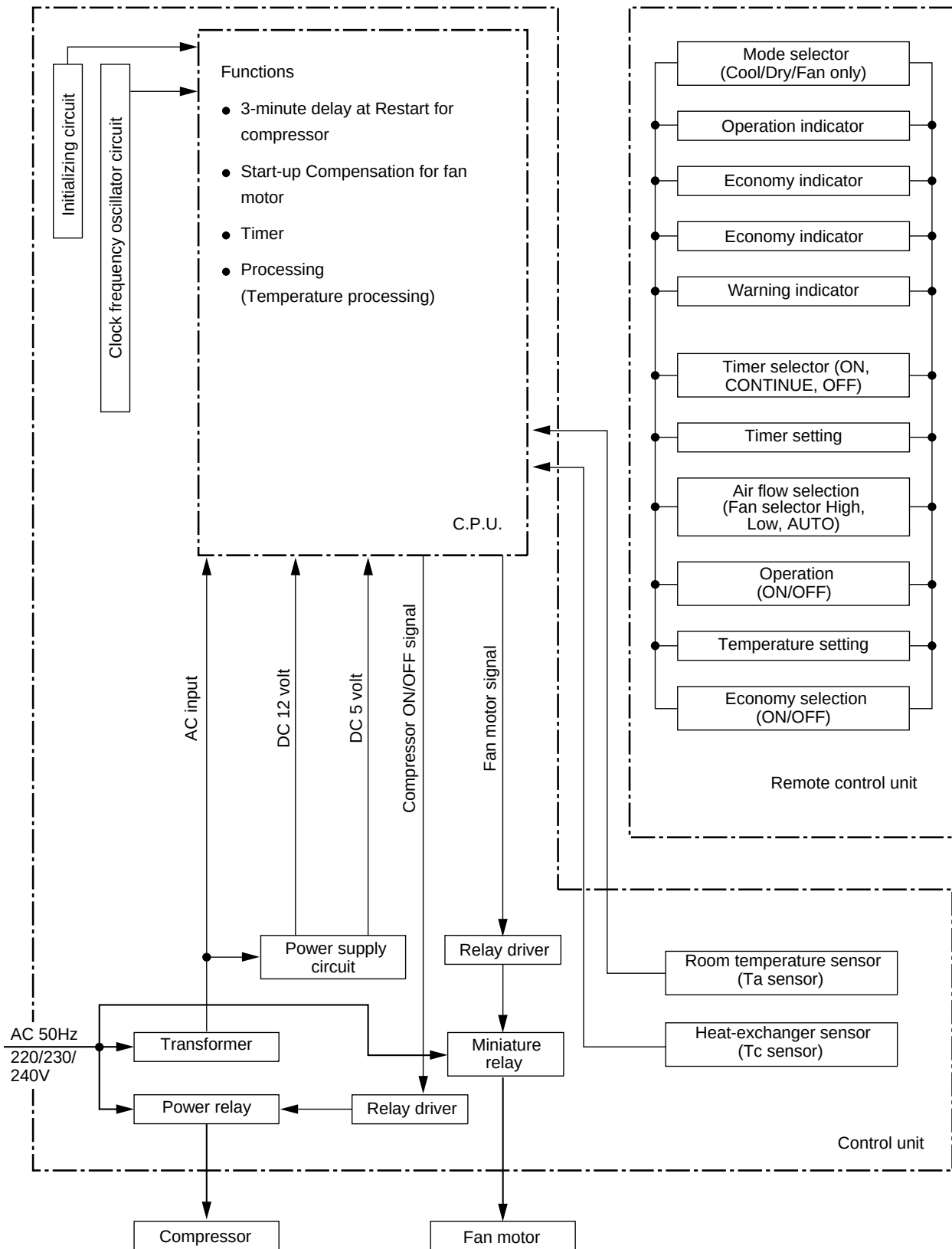
Table 7-1

Conditions		Surface temp. of heat exchanger interchanging pipe (°C)		Ambient temp. conditions DB/WB (°C)	
		T ₁	T ₂	Indoor	Outdoor
Cooling	Standard	10	50	27/19	35/24
	High temperature	17	57	32/23	43/26
	Low temperature	5	34	21/15	21/15

Note:

Measure the heat exchanger temperature at the center of U-bend. (By means of thermistor thermometer.)

8. MICROCOMPUTER BLOCK DIAGRAM



A bold line denotes a 220/230/240V AC line.

Fig. 8-1

9. OPERATION DESCRIPTIONS

9-1. Operation Control Knobs on Control Panel

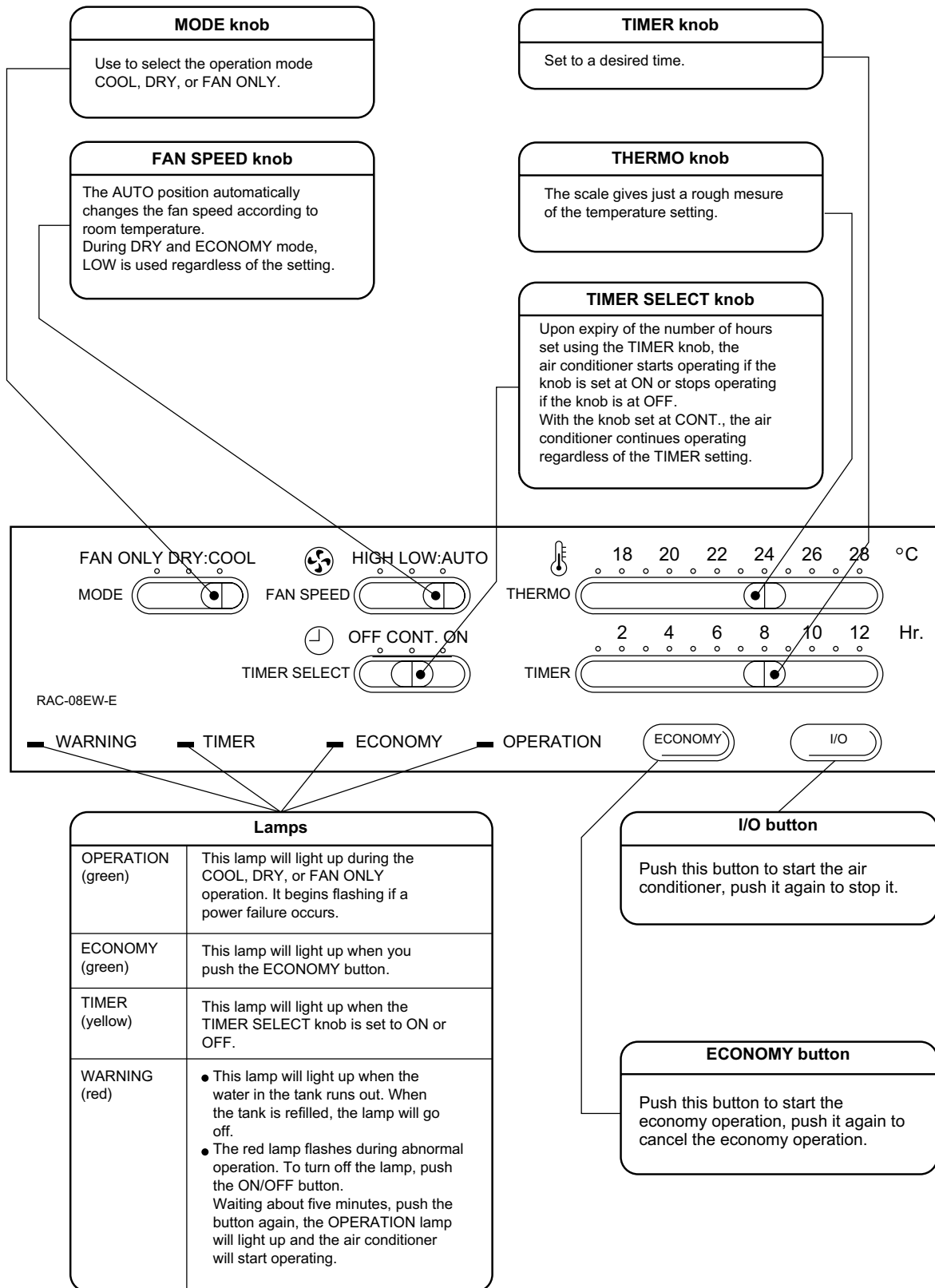


Fig. 9-1

10. OUTLINE OF OPERATIONS

10-1. Basic Operation

- (1) When I/O button is pushed, the relays RY01, RY02 or RY03 and power relay RY07 start according to the conditions set by FAN SPEED knob selector switch. Thus, the indoor fan motor and compressor are controlled. (Operations as described in this paragraph are all programmed. And following items are same as it.)
- (2) When the I/O button is pushed again, the relays are all disabled, and the air conditioner stops.
- (3) When the I/O button is pushed with the timer set at any desired time, the relays are all disabled and the air conditioner stops when the timer reaches the set time. However, if the operation is started with the timer set to "CONTINUE", the operation continues.
- (4) To adjust the room temperature, set the knob mounted on the control panel at desired temperature. The room temperature sensor detects and controls the adequate temperature.
- (5) When the FAN SPEED selector switch is set to "AUTO", the volume of air is controlled to be felt agreeable.

10-2. Economy Mode

This control mode establishes some zones corresponding to different combinations of on and off intervals of the compressor and selects a suitable zone depending on the lapse of time from the start of operation and the temperature.

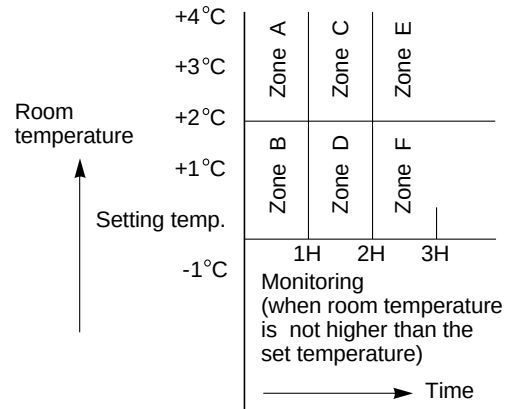


Fig. 10-1

Table 10-1 During cooling

Lapse from start	Zone	Compressor
0 to 1 hour	A	ON OFF 18 – 4 minutes
	B	ON OFF 3 – 4 minutes
1 to 2 hours	C	ON OFF 5 – 7 minutes
	D	ON OFF 3 – 7 minutes
2 hours ~	E	ON OFF 5 – 10 minutes
	F	ON OFF 3 – 10 minutes

Table 10-2 During drying

Lapse from start	Zone	Compressor
0 to 1 hour	A	ON OFF 5 – 4 minutes
	B	ON OFF 3 – 4 minutes
1 to 2 hours	C	ON OFF 5 – 7 minutes
	D	ON OFF 3 – 7 minutes
2 hours ~	E	ON OFF 5 – 10 minutes
	F	ON OFF 3 – 10 minutes

10-3.Dry Mode

In this mode, a microcomputer control lowers humidity while maintaining a constant temperature. The microcomputer turns the compressor on and off at regular intervals (3 to 6 minutes on and/or off). During the halt, the airflow fan stops as well.

The compressor and airflow fan will operate independent of the temperature control, though the pattern of operation depends on the relation between room temperature (T_A) and set temperature (T_S), as shown below:

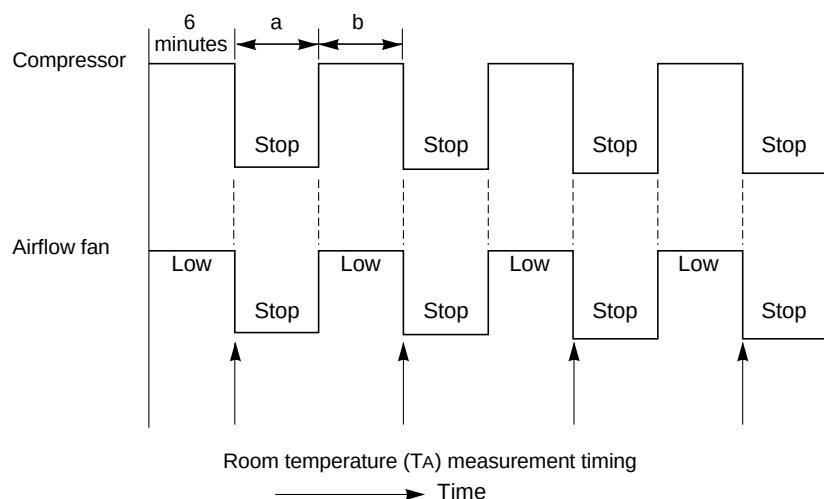


Table 10-3

Relation between room temp. (T_A) and set temp. (T_S)	OFF period a	ON period b
$T_A > T_S + 2$	4 min.	6 min.
$T_S + 2 > T_A > T_S$	5 min.	5 min.
$T_S > T_A$	6 min.	3 min.

The airflow fan will operate in the Low position, independent of the position of the airflow setting control.

Fig. 10-2

10-4.Economy Operation

- (1) When the economy button is pushed, the economy lamp is lit and the economy operation will start. (But this operation will not start in the mode of fan only.)
- (2) The economy operation with the cooling and dry modes will be performed in the manner as stated below.

10-4-1. Cooling Operation

- (1) The compressor will be operated by means of ON/OFF interval operation.
- (2) The room fan will be controlled as stated below:
 - When compressor is turned on: L
 - When compressor is turned off: UL
 - When monitoring: OFF
- (3) An interval operation will be started from OFF time. But when starting operation, it will be kept in ON position for 6 minutes.

10-4-2. Dry Operation

- (1) ON/OFF interval operation both of the compressor and fan will be performed (At the OFF time, both of the compressor and fan will be set to OFF.)
- (2) Wind capacity is of L.
- (3) An interval operation will be performed in $T_A \geq T_S$ condition.

10-4-3. Fan Operation

- (1) When operation change over switch is set to fan operation, the economy operation shall not be executed. And the economy lamp shall not be lit too. (Normal fan operation will be performed.)

T_A			
↑			
+3	18 min ON -4 min OFF	5 min ON -7 min OFF	5 min ON -10 min OFF
+2			
+1	3 min ON -4 min OFF	3 min ON -7 min OFF	3 min ON -10 min OFF
T_S			
	Monitoring (Compressor, OFF. Fan, OFF)		
	1	2	Time

Fig. 10-3

11. TROUBLESHOOTING CHART

Troubleshooting procedures:

- Following the details of “What to be prechecked first”, make sure of the basic items.
- When there is no trouble corresponding to above, check in detail the faulty parts following “How to judge faulty parts by symptoms” later.

11-1. What to be Prechecked First

11-1-1. Power Voltage

The power voltage must be from AC 198V to 264V. If the power voltage is not within this range, the air conditioner may not work normally.

11-1-2. Operations not Regarded as Failure (Program Operation)

In terms of the control of air conditioner, the operations shown in Table 11-1 are made as a program operation incorporated in a microcomputer. If a claim is made about the operation, check it corresponds to the contents in Table 11-1. If it does, it is an indispensable operation for the control and maintenance of the air conditioner but not a failure of the units.

- **Operations which are not deemed trouble**

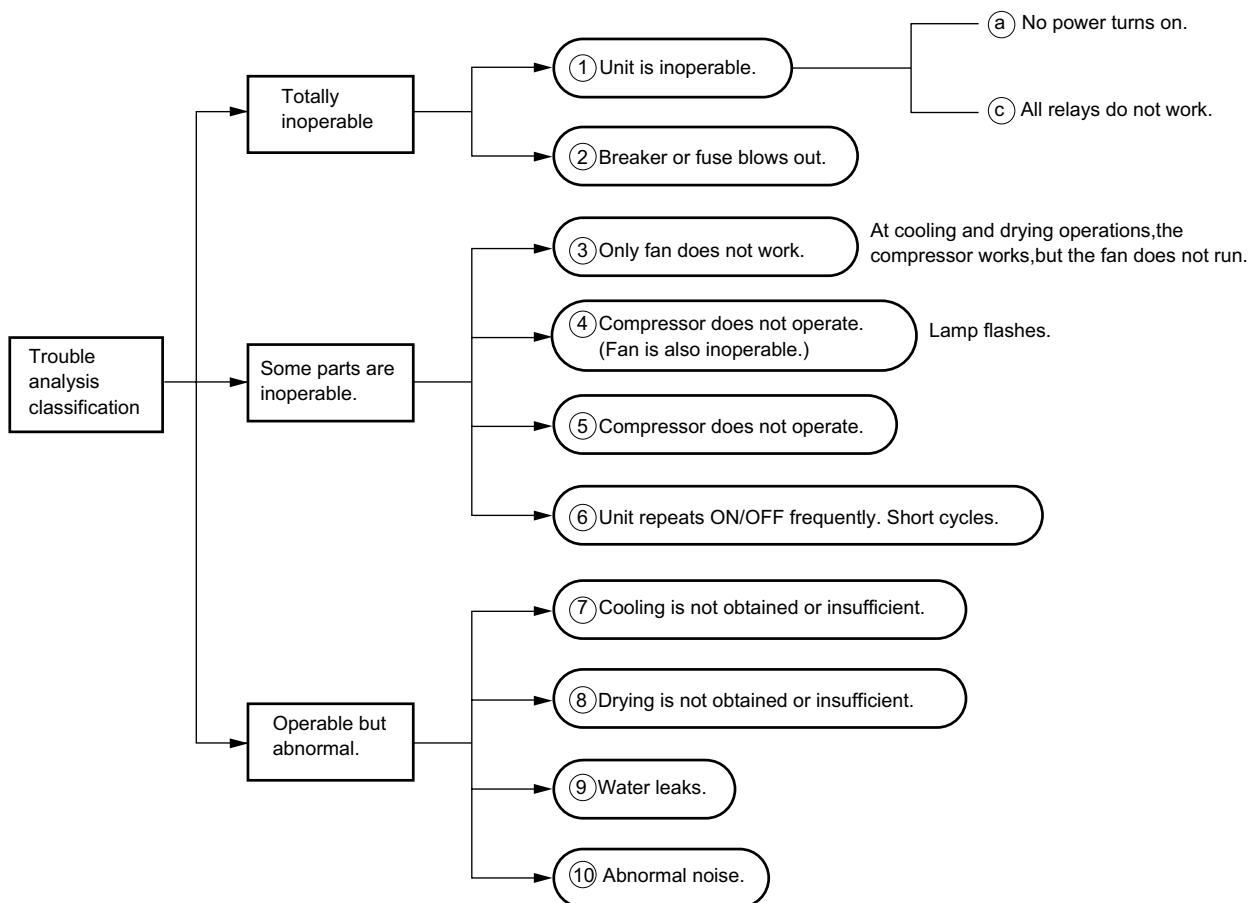
Table 11-1

Operation of air conditioner	Description
When the POWER plug socket of the unit is inserted, the operation lamp on the control panel flashes.	The operation lamp flashes indicating that power is turned on. If this happens, push the I/O button once, and flash will stop. Power failure also causes the same lamp to flash.
Room temperature is in the range under which the compressor is turned on and the operation lamp is lighting, but the compressor will not start.	The compressor will not start while the compressor restart prevention timer (three-minute timer) is actuated. This applies also when power is turned on.
Fan speed remains unchanged when the fan speed knob is operated in the dry mode.	Fan speed is fixed at Low in the dry mode.
The indoor fan occasionally stops intermittently in the dry mode.	In the dry mode, the fan operation is synchronized with the compressor. As a result the fan is stopped when the compressor is stopped.
The compressor will not switch on or off even when the Thermo control is operated in the dry mode.	In the dry mode, the compressor goes on and off at regular intervals independent on the Thermo control.
Warning lamp is lit and no cold air comes out.	When water in the tank has been drained out, stop the operation of the compressor for safety. Fill the water in the tank.
Warning lamp blinks and no cold air comes out.	When the temperature in the freezing cycle (high pressure side), stop the operation of the compressor for safety. Be sure that the exhaust port has plugged with something or water is not remain in the exhaust hose.
At the mode of fan only, the economy lamp is not lit when the economy button is pushed.	In case of the fan only mode, the economy lamp will not be lit since the economy control will not be performed.
The push button has not returned when the economy button is pushed.	The economy button is of lock type. When the button is pushed again, the button is set to OFF and the button will come out. The operation button will come out all the time since it is not of lock type.

11-2. How to Judge Faulty Parts by Symptoms

One of the most important matters for the repair of air conditioners is accurate trouble analysis. For this purpose, it is required to make a correct judgement about the problem by asking the user.

11-2-1. Trouble Analysis Classification

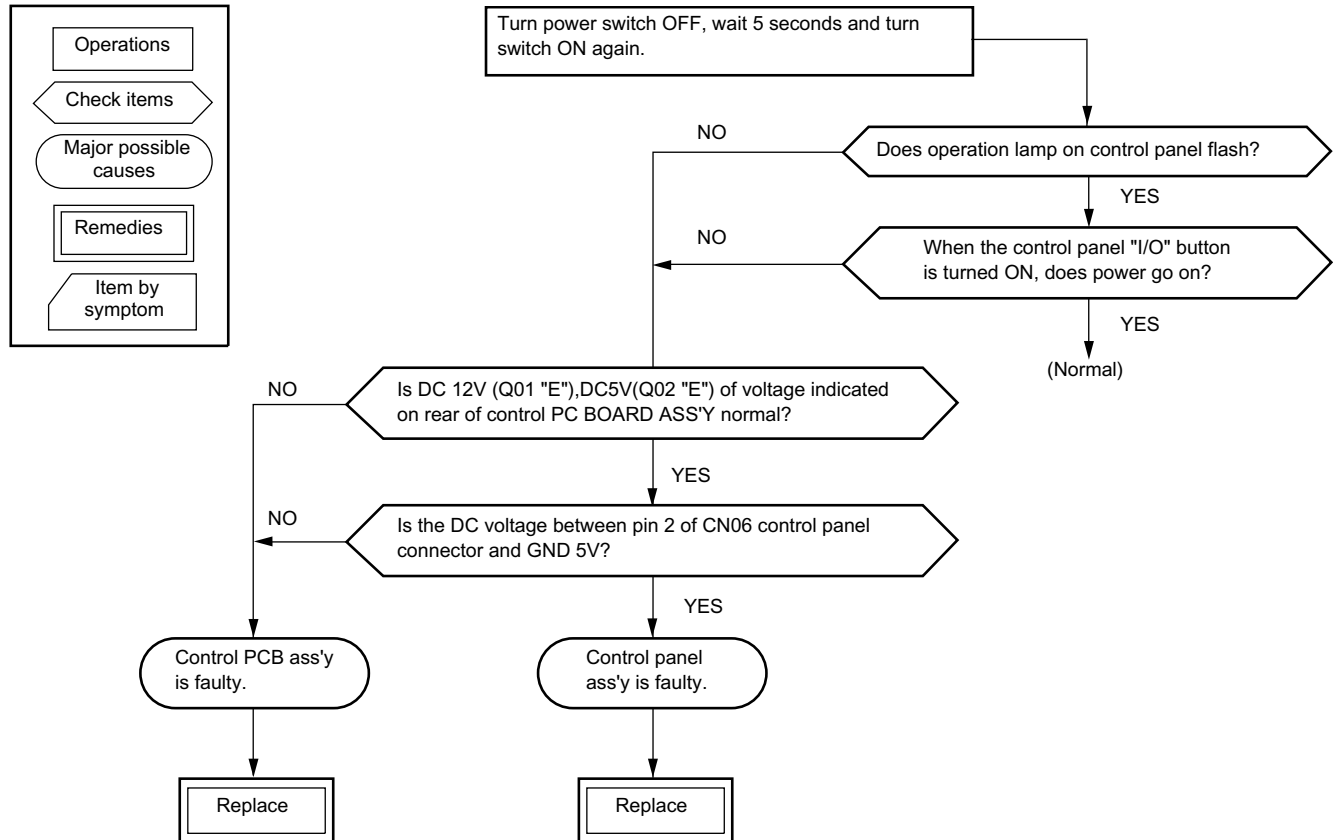


11-2-2. No Power Turns On (Air Conditioner Does Not Operate)

<Precheck>

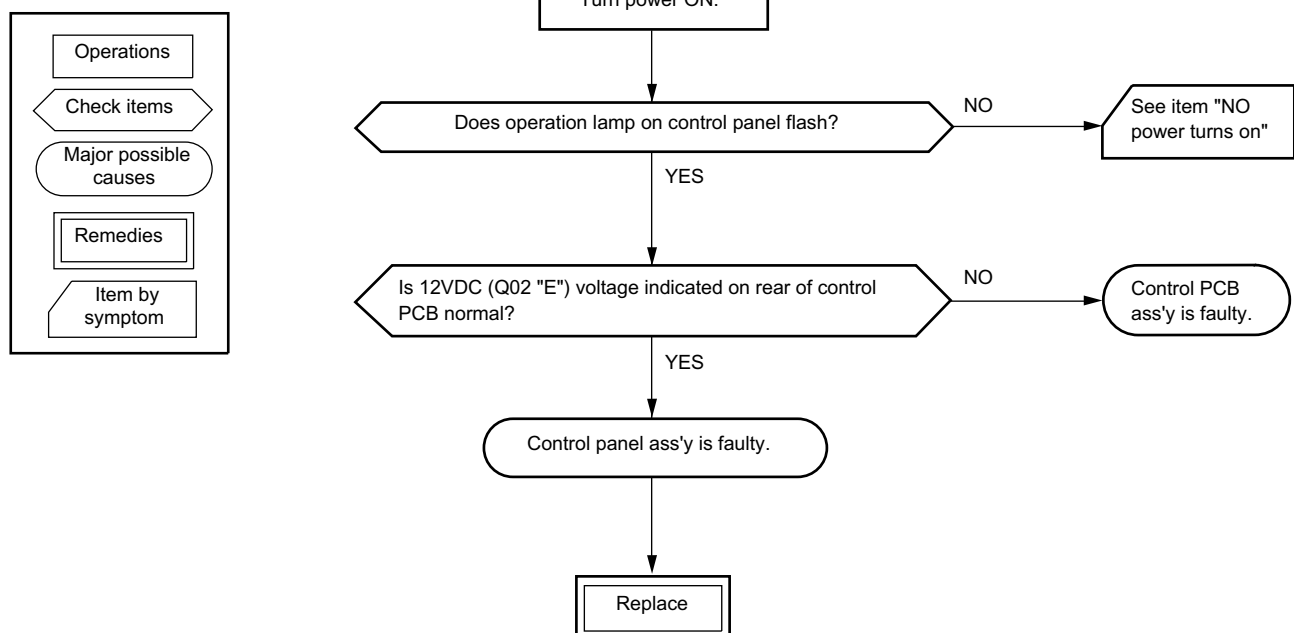
- (1) Is voltage to wall socket normal?
- (2) Has cord plug fully sealed in the socket?
- (3) Is water filled in the tank?
- (4) Is timer set in timer mode? (Is timer select switch set to ON?)

<Checking Procedures>



11-2-3. All Relays Do Not Work

<Checking Procedures>

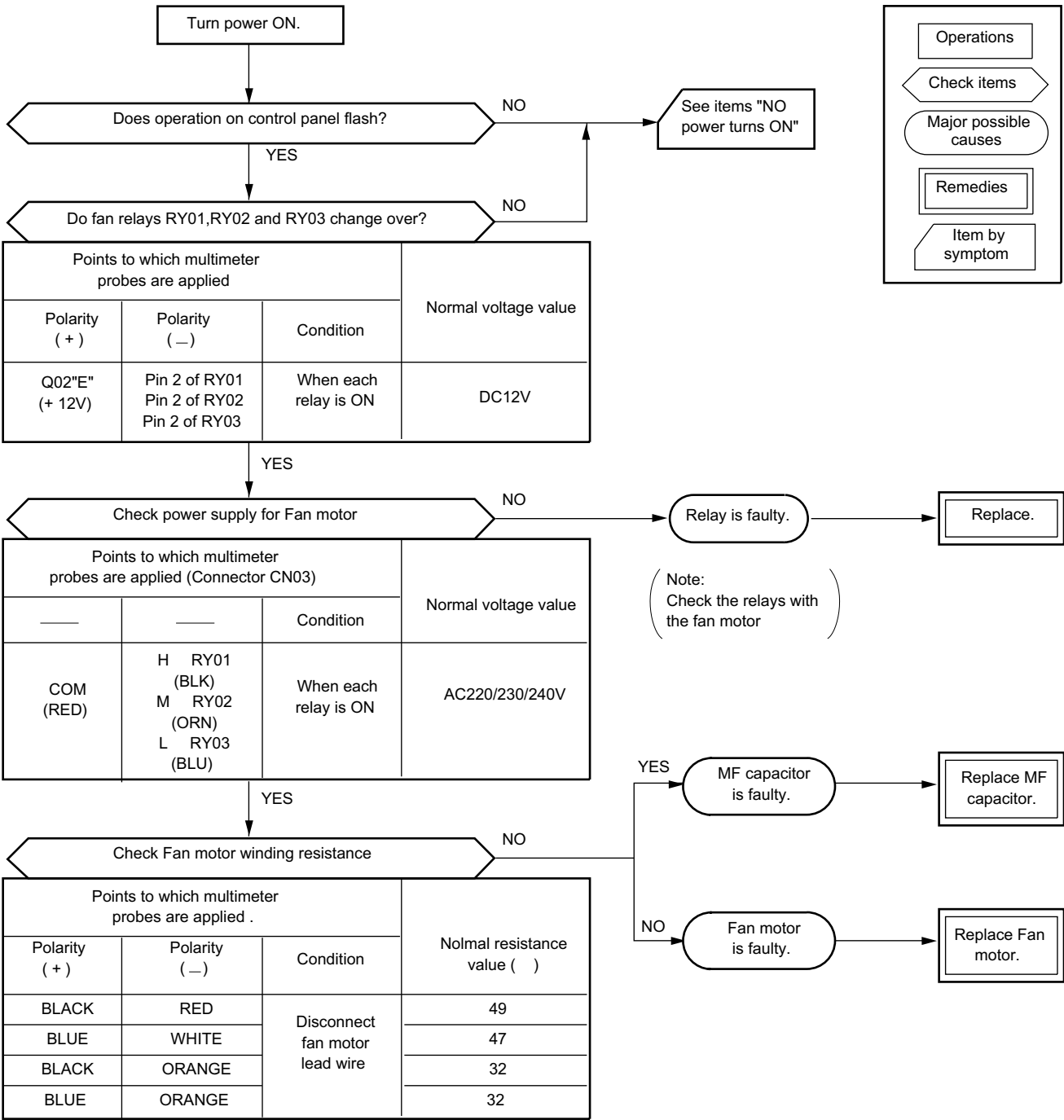


11-2-4. Only Fan Does Not Work

<Precheck>

(1) Does fan rotate even in the cool mode and the fan only mode?

<Checking Procedures>

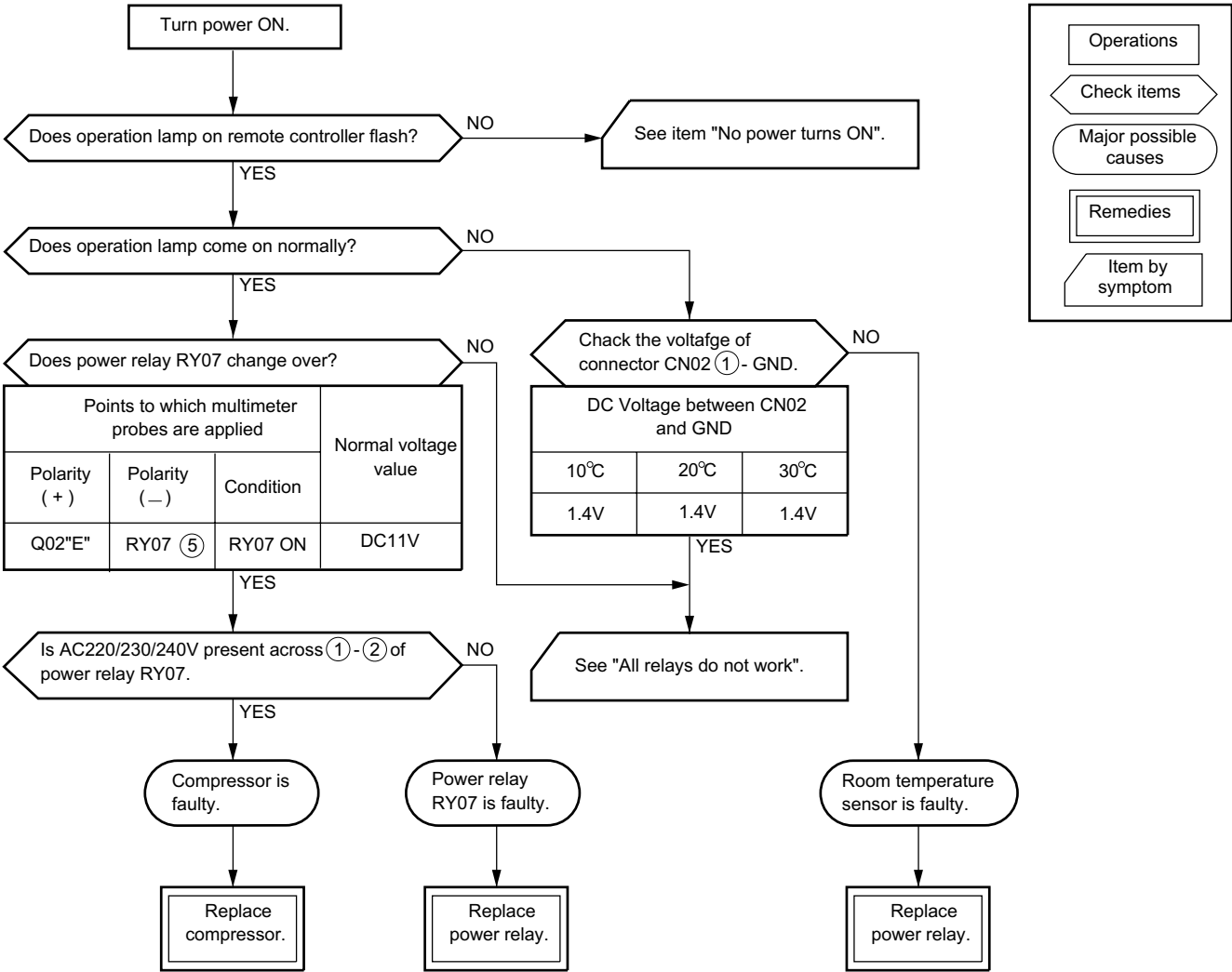


11-2-5. Compressor Does Not Operate

<Precheck>

- (1) Is room temperature control on the control panel higher than room temperature in the cool mode?
- (2) Is the MODE selector knob on the control panel left set to "FAN ONLY"?

<Checking Procedures>

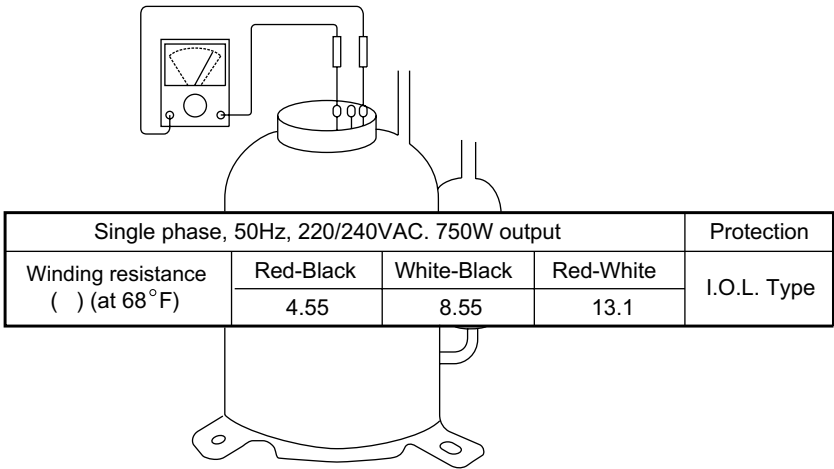
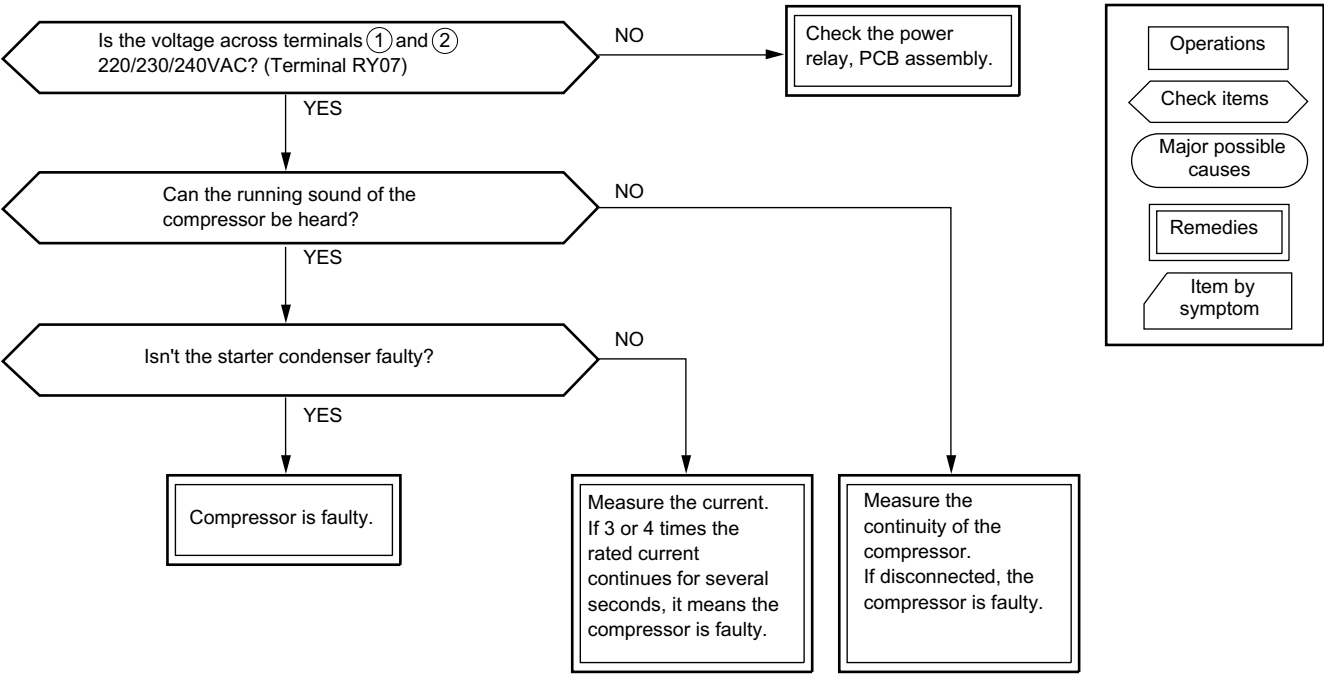


11-2-6. Compressor Does Not Operate

<Precheck>

- (1) Is the target room temperature specified by the remote controller assembly higher than current room temperature, in the cool mode?
- (2) Are the wiring and contacts of connecting cables in a satisfactory condition?

<Checking Procedure>



11-2-7. The Unit Repeats ON/OFF Operation Frequently

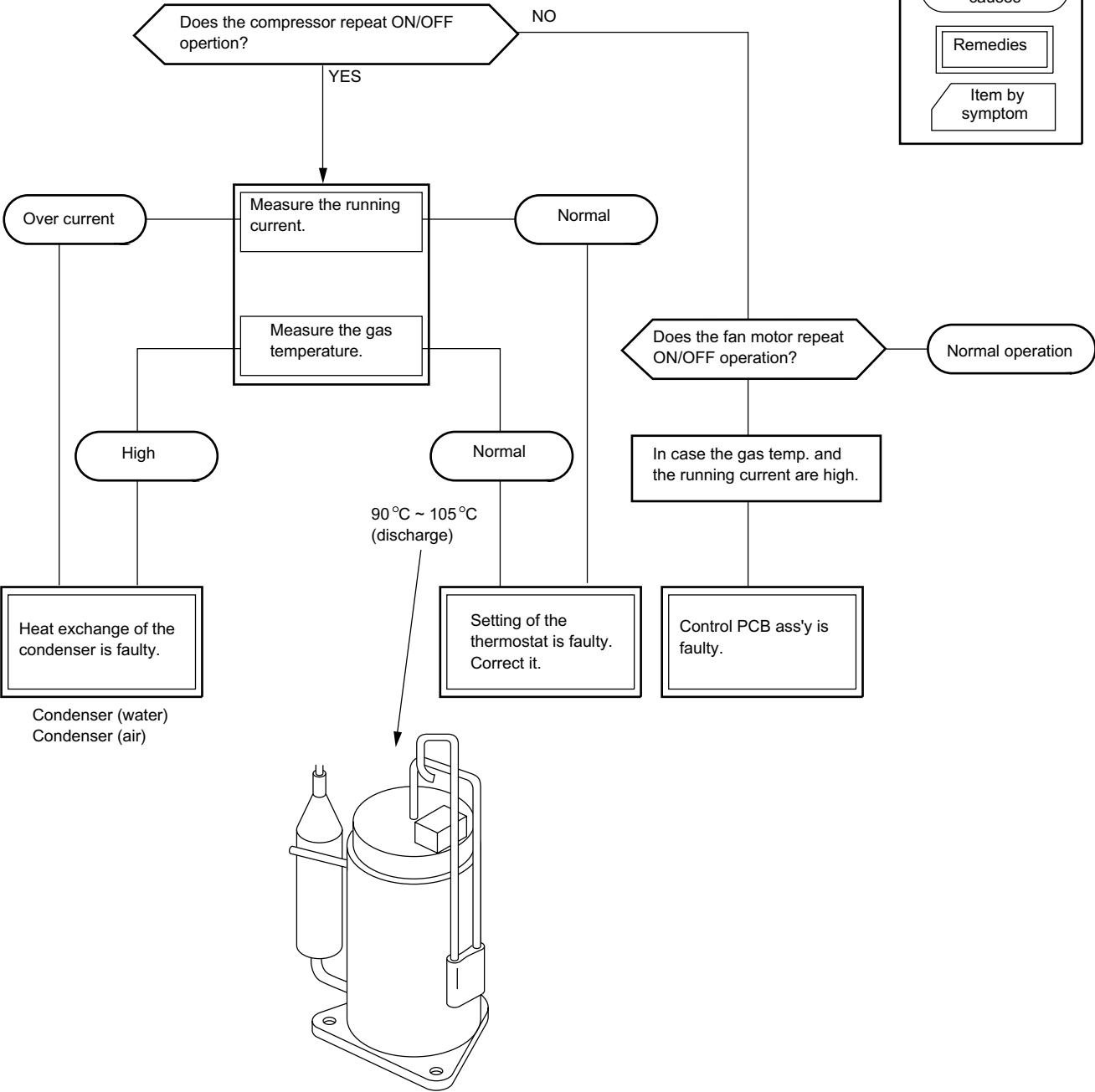
Operations

Check items

Major possible causes

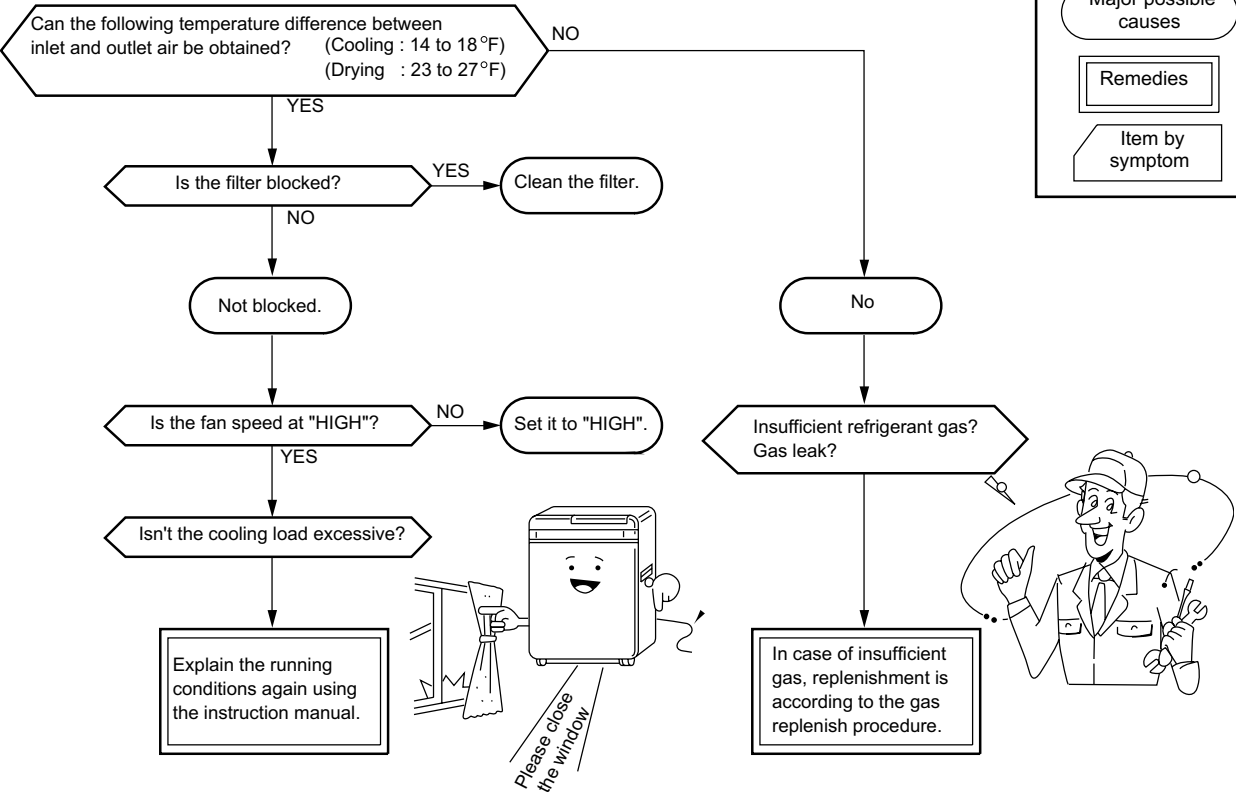
Remedies

Item by symptom

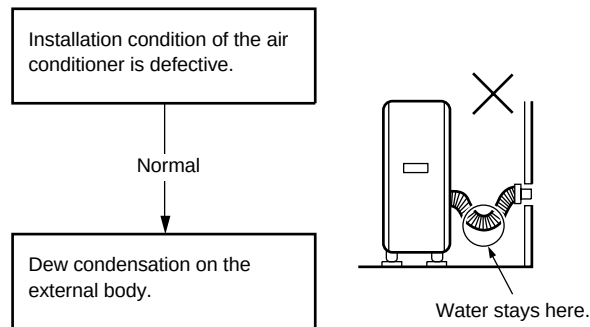


11-2-8. Operable But Abnormal
(A) No or insufficient cooling/drying

Operations
Check items
Major possible causes
Remedies
Item by symptom

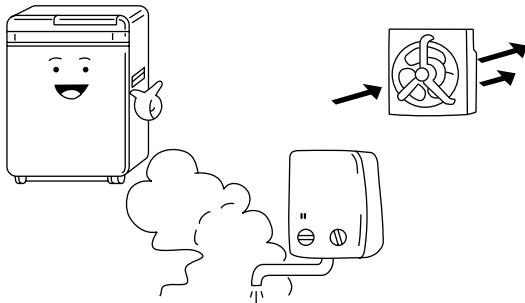


(B) Water Leaks

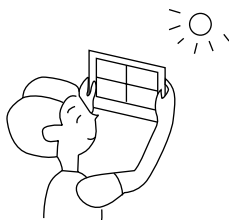


Causes:

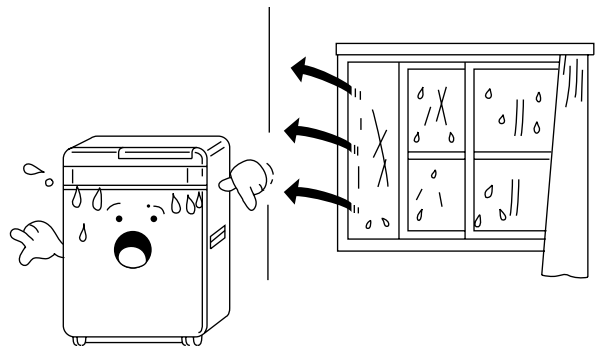
- (1) There is a moisture generating source in the room.
- Note that, even if a ventilation fan is not in operation, if it is open to the outside, the condition is same as the one in operation.



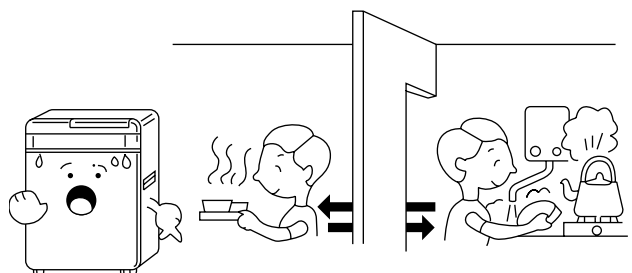
- (2) Air volume is remarkably reduced.
- Air filter is blocked, resulting in the reduction of air volume.
 - Low fan operation causes the lowering of running voltage, resulting in the reduction of air volume.
 - If the voltage is in the range of 198 – 264V, it is normal.



- (3) Window has been kept open while raining, and after that, cooling operation is started.
- On rainy days, relative humidity may become as high as 90% or higher. If doors or windows are open to the outside, close them.

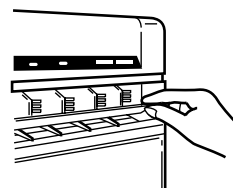


- (4) When a man goes in and out between a room with high humidity and one with low humidity. Or, in case there is no door between such rooms.
- Even if there is no moisture generating source in the room where the air conditioner is installed, in case people go in from and out to a room with high humidity frequently, or in case there is no door between the rooms, the situation becomes the same.



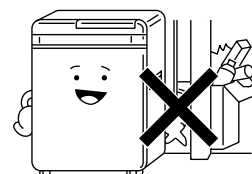
(C) Abnormal Noise

[Symptom]
Intermittent noise as if something is fluttering in the wind.
Air blows in and out at the air discharge port.



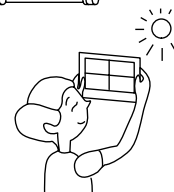
Obstacle

Check if there is an obstacle which hinders the air flow to any extent.



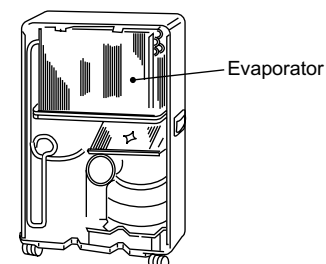
No

Check whether the air filter is dirty or not.



Clean

Check whether the evaporator is dirty with dust or oil or not.



11-3.PC Board Layout

Top view

Bottom view

12. INSTALLATION INSTRUCTION

Read the installation manual carefully before installing the air conditioner.

The following items in table 12-1 are included as the accessories.

Table 12-1

Parts name	Q'ty
Owner's manual	1
Installation manual	1
Exhaust hole	3
Exhaust hose	1
Caster seat	4
Cap (for exhaust hole)	3

12-1. Installation Method

- (1) Insert the connection port (round) into the air conditioner surely to its root.
 - 1) The exhaust hose may be extended or contracted from approx. 500 mm to approx. 1,400 mm, but use it in its shortest length if possible.
 - 2) Be careful that a U-shaped bend or slack is not yielded in the way of exhaust hose.
 - 3) When you move the air conditioner, be sure to pull out the exhaust hose and don't lay down the air conditioner.

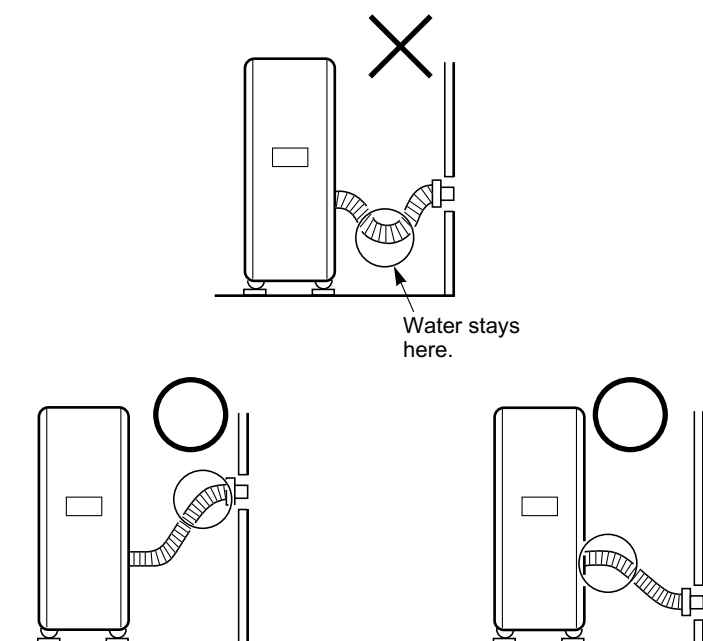


Fig. 12-1

- 4) If the exhaust hose is set with its tip down, the water condensed within the hose might leak out of the room. It is therefore recommended to set the hose with its tip kept higher than the air outlet of the air conditioner properly.

- (2) Put a seat under each caster.
- (3) Electrical wiring.

Table 12-2

Model	Power source	Plug socket rating	Fuse rating
RAC-08EW-E	1φ 50 Hz, 220/230/240V	7A	7A

12-2. Routine Maintenance

- (1) Be sure to observe the following for a longer service life of your air conditioner.
 - Cleaning of air filter: Once every two weeks
 - Changing of water in tank: Once ever week
- (2) Be sure to drain out the water in tank during every off season.

12-3. Water Supply

- (1) The water in tank decreases gradually in the course of cooling operation.
- (2) If the water is run out, the warning lamp lights up (in red) and the operation mode is switched to blowing. Then, refill the water.
- (3) Open the front door, being down the tank toward you, and lift off the tank.

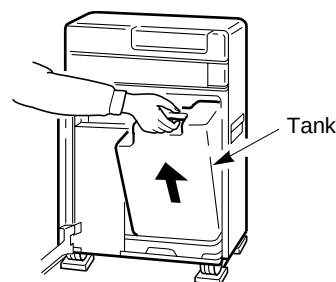


Fig. 12-2

12-4.Changing of Water

- (1) As the water in tank becomes dirty gradually in cooling water, change the water once every week.

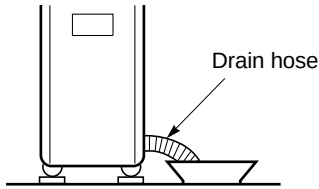


Fig. 12-3

- (2) The water in tank becomes 50° or so in cooling operation. It is abnormal at all.

12-5.Relocation of Air Conditioner

- (1) When you move the air conditioner, be sure to drain out the water in tank first, and do not lay down the air conditioner.

13. CLEANING METHOD OF CONDENSER

13-1. Condenser Servicing Procedures

- (1) Pull out the air filter.
- (2) Remove six screws at the back and take off the rear panel. Also, pull out the drain hose from case of hose.
- (5) Remove two screws fastening the condenser cover (one in the front part and another in the rear).

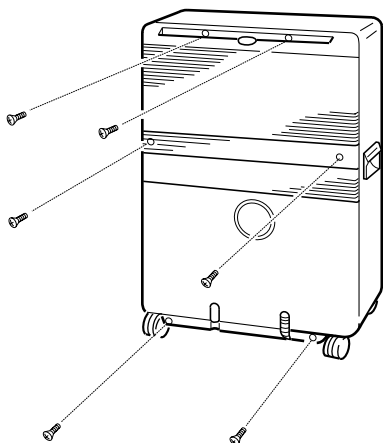


Fig. 13-1

- (3) Open the front door and remove the tank.
- (4) Remove the inner cover (screwed down at five spots).

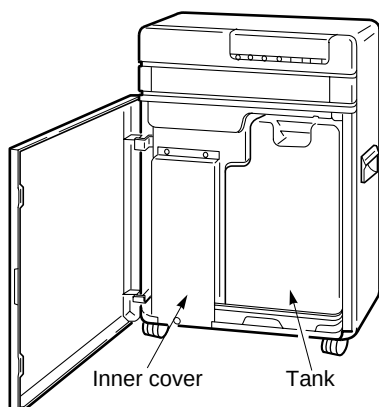


Fig. 13-2

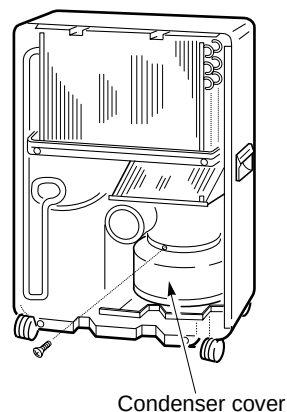


Fig. 13-3

- (6) Remove the condenser cover by pulling it obliquely upward, then the condenser will be exposed.
- (7) When assembling, follow the reverse procedures.

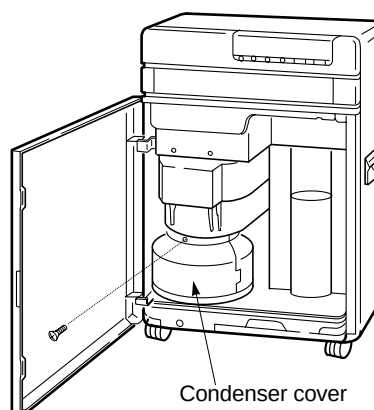
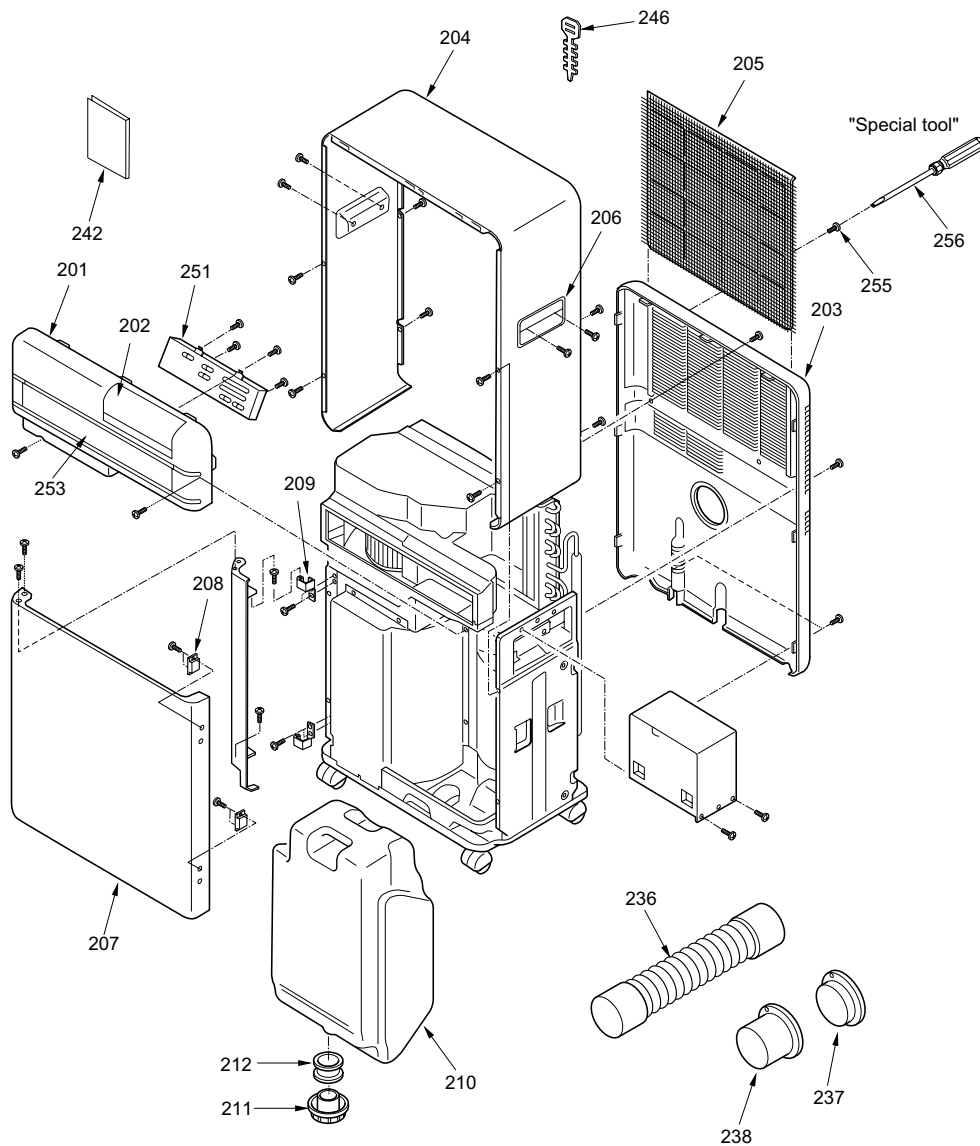


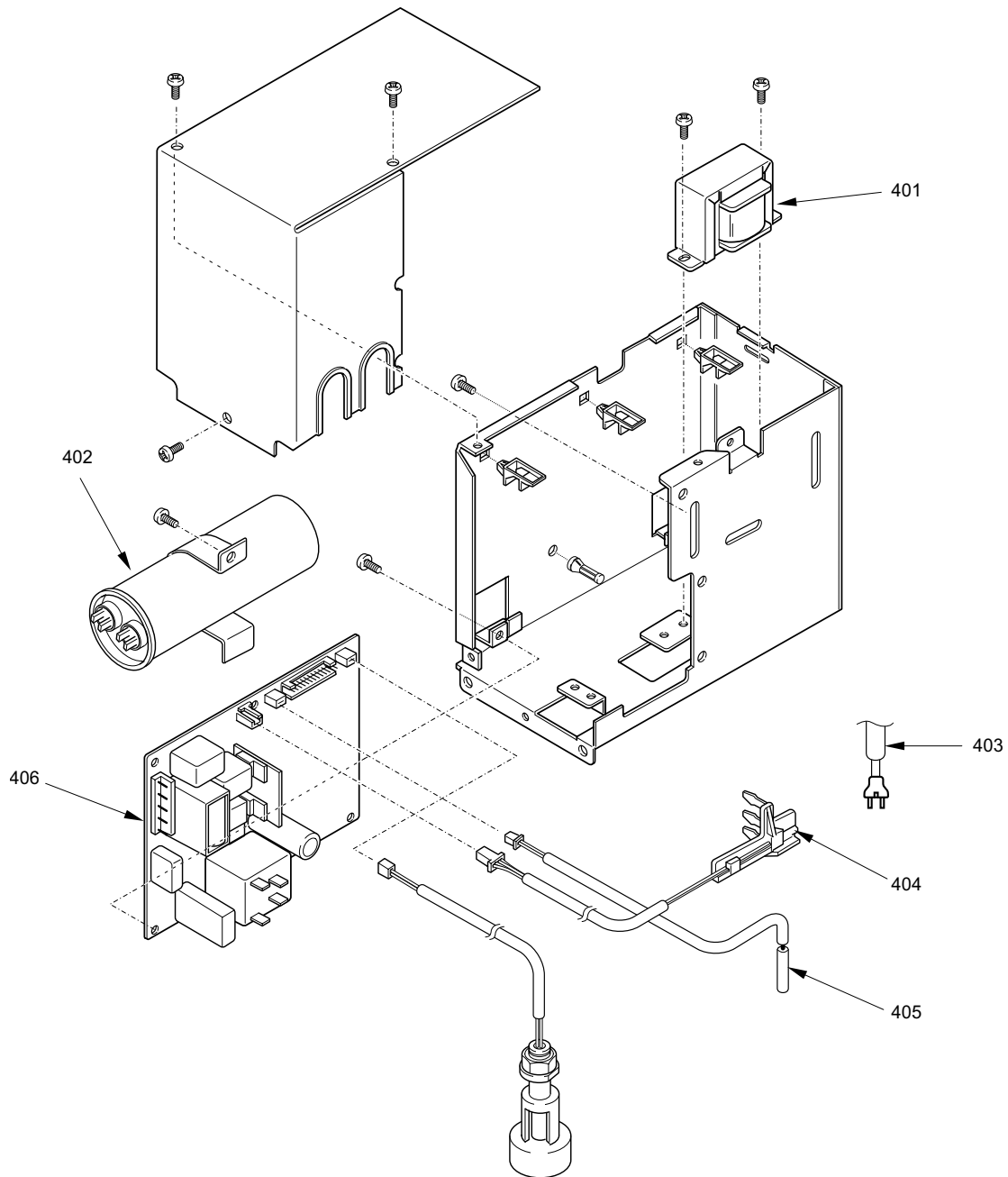
Fig. 13-4

14. EXPLODED VIEWS AND PARTS LIST



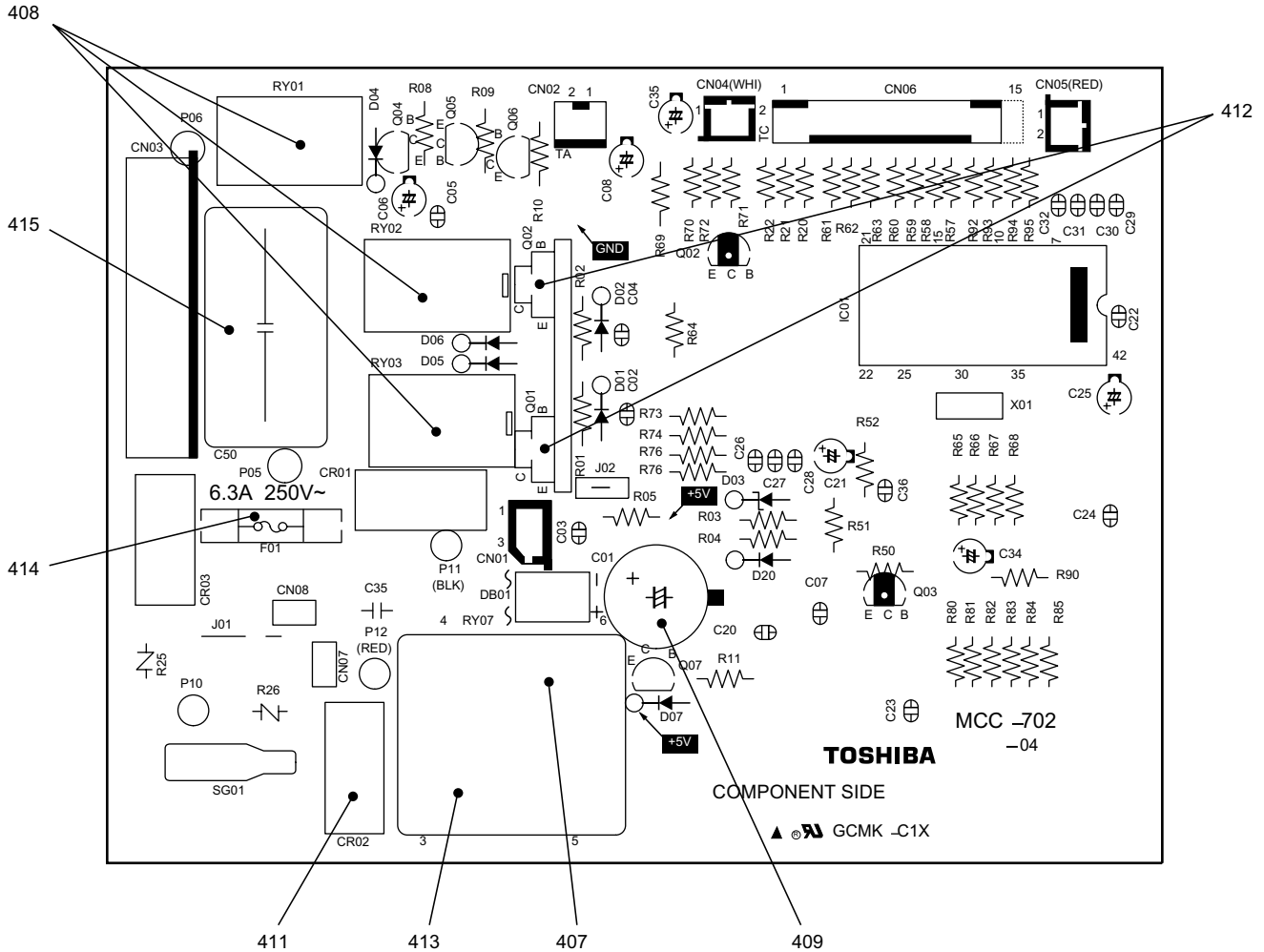
Location No.	Part No.	Description
201	43000679	Front Panel
202	43008399	Door, Control-Panel
203	43003190	Cabinet, Back
204	43000680	Cabinet
205	43080332	Air-Filter
206	43019800	Handle
207	43000678	Door, Front
208	43007917	Magnet Catch
209	43007916	Cover, Hinge
210	43079225	Tank, Water
211	43079226	Cap, Water-Tank

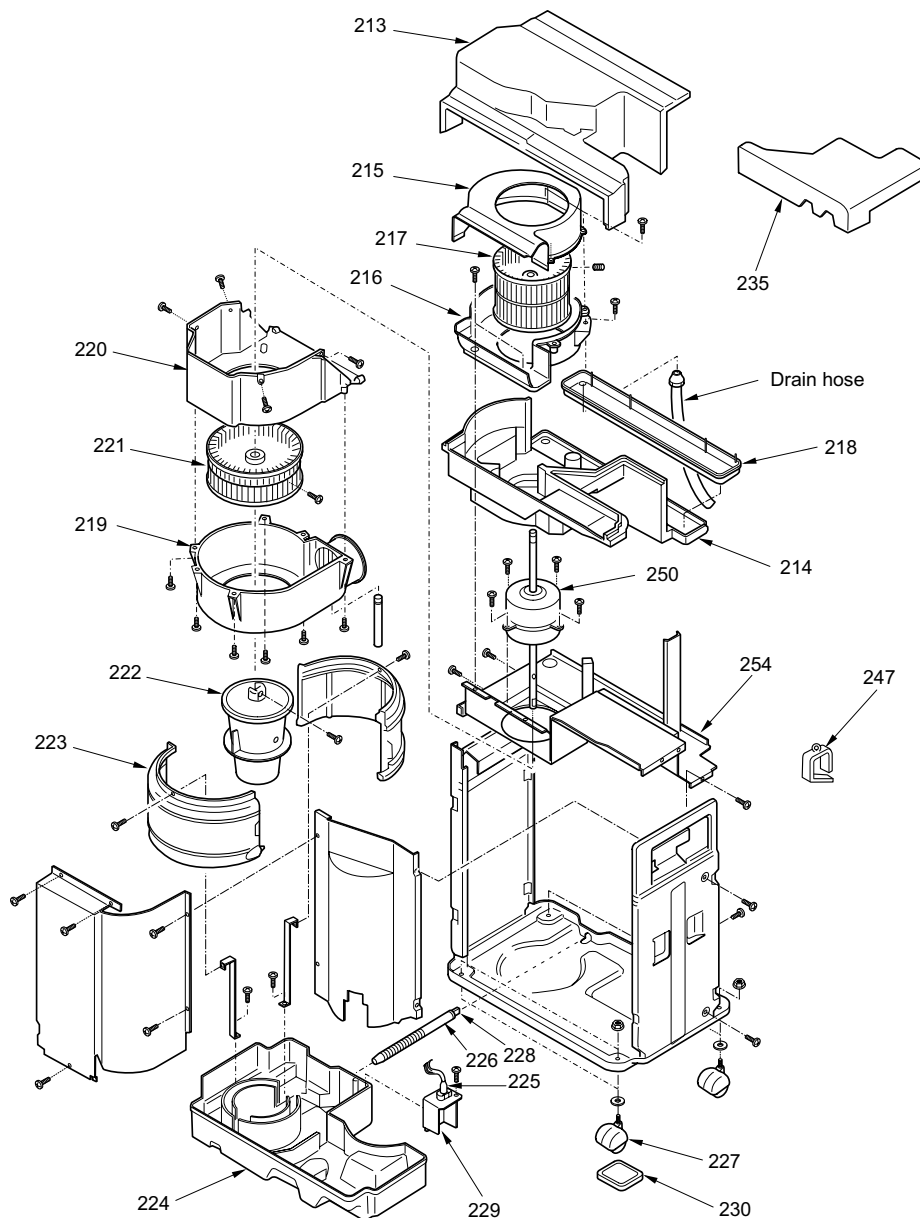
Location No.	Part No.	Description
212	43079081	Cap, Water-Tank
236	43089126	Exhaust-Hose
237	43089127	Cap, Exhaust Hole
238	43089128	Exhaust Hole
242	43088645	Owner's Manual
246	43069760	Cord Band
251	43068437	Control Panel
253	43009439	H-Louver
255	43097200	Tamper-Proof-Screw
256	43082263	Screw Driver (Tamper-Proof-Screw)



Location No.	Part No.	Description
401	43058255	Transformer, FT67-2
402	43055420	Capacitor, Electrolytic
403	43060064	Cord, Power
404	43050341	Thermo-Sensor
405	43050340	Sensor, Heat Exchanger
406	43068439	PC Board Assembly
407	43031090	Diode-Block
408	43034070	Relay-Miniature, JE-X
409	43033197	Capacitor, Electrolytic

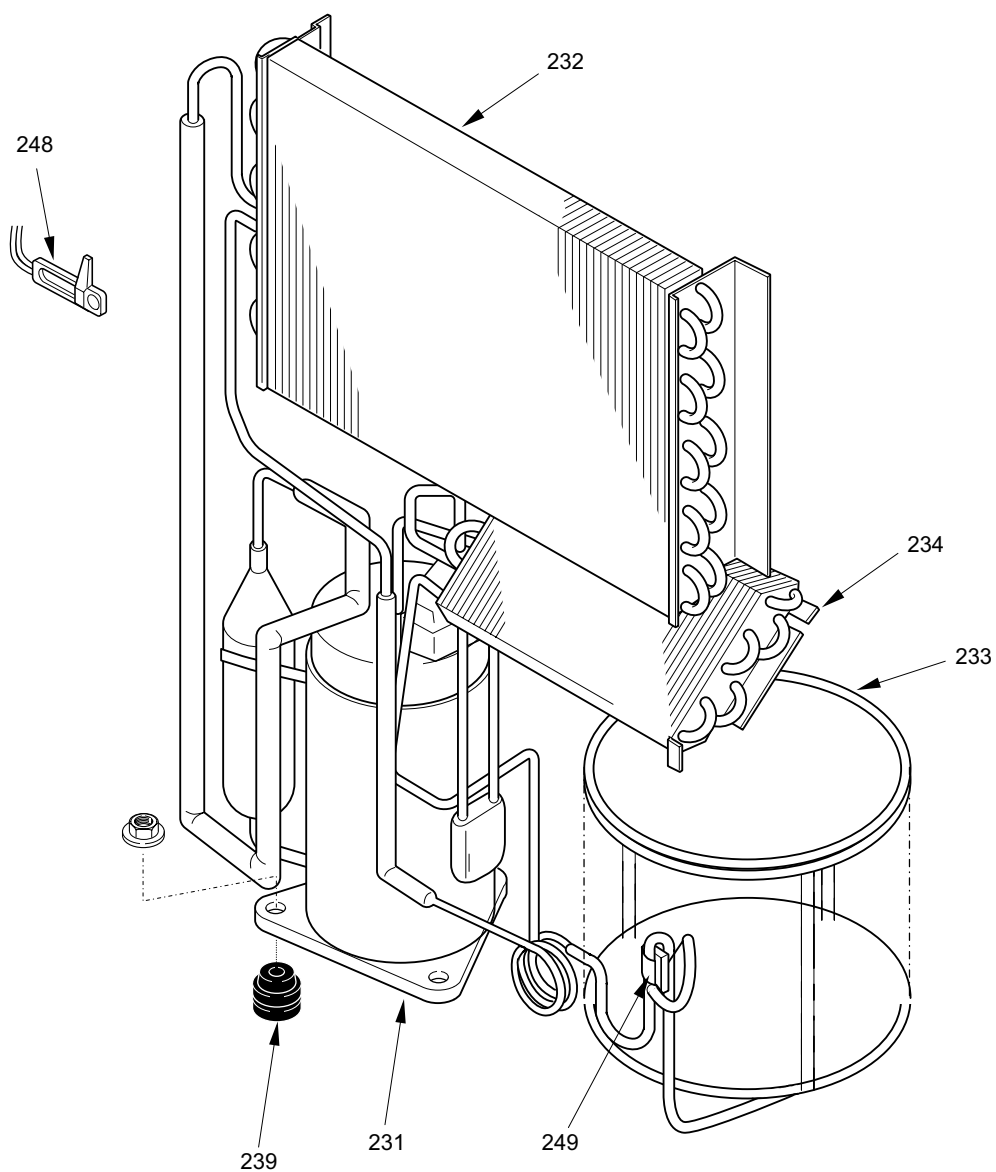
Location No.	Part No.	Description
410	43055359	Toshiba Nonlinear Resistor
411	43035573	Surge Absorber
412	43031043	TR, 2SD880Y
413	43034036	Relay, Power
414	43060899	Fuse
415	43055462	Capacitor, EEP Series
416	43055284	Toshiba Nonlinear Resistor
417	43055508	Capacitor, CK





Location No.	Part No.	Description
213	43022394	Casing, Up
214	43022395	Casing, Low
215	43022396	Case, Fan, Up
216	43022397	Case, Fan, Low
217	43020249	Fan, Multi-Blade
218	43072327	Drain-Pan
219	43022392	Case, Fan, Exhaust
220	43022393	Cover, Fan, Exhaust
221	43020250	Fan, Multi-Blade
222	43020251	Fan, Water
223	43049666	Cover, Condenser
224	43072326	Water-Vessel

Location No.	Part No.	Description
225	43051323	Switch, Float
226	43070139	Hose, Water
227	43019829	Caster
228	43079087	Cap
229	43063164	Cover, Switch
230	43089106	Seat-Caster
235	43011508	Cushion, Sub
247	43069761	Wire-Saddle
250	43021870	Motor, AC, 230V, 50Hz, Fan STF-230-20-4C
254	43039306	Plate, Blower



Location No.	Part No.	Description
231	43041589	Compressor, PH94X1-4G1
232	43044543	Evaporator
233	43043523	Condenser
234	43043524	Condenser, Air

Location No.	Part No.	Description
239	43095302	Cushion, Rubber
248	43007890	Holder, Sensor, TA
249	43063188	Holder-Sensor-TC

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